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AUTHOR Taylor, James A.; Farace, Richard V.
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ABSTRACT

This paper argues that people who interact regularly and repetitively among themselves create a conjoint information space wherein common values, attitudes, and beliefs arise through the process of information transmission among the members in the space. Three major hypotheses concerning informal communication groups in organizations were tested in a study which employed data gathered by survey instruments from a Midwest manufacturing concern of approximately 450 employees. The results of the study showed that members of informal groups feel less inclined to trust their work team members; less willing to advocate staying with the work team; less willing to rate highly the performance of their group; and less likely to see themselves as substantially important to the productivity of the team. (TS)

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The Referential Function of Internal Communication Groups in Complex Organizations: An Empirical Analysis

James A. Taylor

Richard V. Farace

Michigan State University

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Richard V. Farace

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It has long been an accepted canon of organizational theory that the informal system of relations prevailing among participants in an organization has significant impact upon the nature of the organization (Selznick, 1947). Selznick advanced three relevant propositions: (1) every organization creates an informal structure; (2) in every organization, the goals of the organization are modified by processes within it; and (3) the processes of modification are brought about by the informal structure.

Further, Selznick argues that informal groups, as part of the informal structure, are norm-providing systems of relations; they arise within organizations largely as a consequence of the idiosyncratic intrapersonal needs of system members. Following the studies at the Hawthorne plant of Western Electric Company, Rothlesberger and Dickson (1939) commented that:

> The study of the bank wiremen showed that their behavior at work could not be understood without considering the informal organization of the group and the relation of this informal organization to the total social organization of the company. (p. 551)

The importance of the role played by the group in industrial organizations has been emphasized by Lewis (1939), Nelson (1949), and Blake and Mouton (1964), among others. Empirically, however, these studies have focused on groups as formally-defined structured entities, rather than as informal liaisons among mutually attracted individuals.

Following Selznick, this paper presents the view that people who interact regularly and repetitively among themselves create a conjoint information space wherein common values, attitudes, and beliefs arise through the process of information transmission among the members in the space. Homans (1950) adapts a similar position at a dyadic level when he states the following propositions:

> If the frequency of interaction between two people increases, the degree of their liking increases, and vice versa.
>
> . . . Persons who feel sentiments of liking for one another will express those sentiments in activities over and above the activities of the external system, and these activities may further strengthen the sentiments of liking.
>
> The more frequently persons interact with one another, the more alike in some respects both their activities and their sentiments tend to become.

Thus, a system, comprised of a number of dyads, might be expected to produce the phenomena noted by Homans in a variety of ways. For example, relationships among co-participants may lead to the adoption of more and more consonant attitudes and behaviors with respect to other members of a system, for any given member passing through the system.

Therefore, it is not surprising that it is often noted--in both the literature on organizational relations and in common parlance--that people who join organizations are changed substantially, even beyond the impact of the actual work they perform (White, 1964). Individuals originating from diverse backgrounds become more similar in their behavioral patterns and in the way they structure their symbolic environment.

Laski (1942) argues that this process of behavioral differentiation arises from the conflict between organization units competing for control. He states:

> (1) Cooperative effort, under the conditions of increasing number and complexity of functions, requires the delegation of functions. Thus action which seeks more than limited, individual results becomes action through agents. It is the activity of officials acting as agents with which the discussion of bureaucracy is concerned.
>
> (2) The use of intermediaries tends to create bifurcation of interest between the initiator of the action and the agent employed. This is due to the creation of two sets of problems: for the initiator, the achievement of the goal which spurred him to action, and for the intermediary, problems which are concerned chiefly with his social position as agent. The character of the agent's new

values are such as to generate actions whose objective consequences undermine the professed aims of the organization. This conflict need not be between the employer as a person or a group and the agent, for the latter may be able to manipulate the ideas of the former, but between the actual course of the organization and those aims formally asserted, whether the employer recognizes the conflict or not.

(3) This bifurcation of interest makes dominant, for initiator and agent alike, the issue of control. What is at stake for each is the control of the conditions (the organizational mechanism) which each group will want to manipulate (not necessarily consciously) toward solving its special problems. In this struggle for control, an informal structure is created, based largely on relationships involving personal influences rather than formal rules.

As individuals enter an organizational system, they become exposed to a new set of behavioral expectations which are communicated from many sources. As tenure increases, the individual continually limits the number of successive input stimuli by exercising some choice over the diverse personalities within the organization with whom he or she wishes to interact. Attitude change is induced by usual and frequent interaction patterns with this chosen body of personalities. Attitude change stems in large part from the messages an individual receives about the kinds of activities and behaviors which are considered appropriate and expected by any informal group of which the individual is a member.

Implicit in the messages an organizational member receives is an attitude set on the part of other members; this set conditions the type of information and the bias attached to the information the member receives. Over time, a similar set will be adopted by the new member, although not holistically. The new member will also contribute some subset of his attitude set to the perceptions of the group, i.e., will be somewhat active, rather than merely passive. Thus, attitudes related to various organizational and other issues will change continuously within groups, over time.

This paper will examine the role of the informal group as a communication vehicle within which organizational norms are developed and maintained. A theoretical rationale for the assumption that shared communication necessarily leads to a convergence of attitudes among a set of communicants can be derived from a general theory of attitude change provided by Woelfel and Saltiel (1975). They argue that every message has an effect which changes the way in which concepts related to the message are arrayed with respect to one another within the mind of the receiver. The amount of movement or change can be described by a vector between the advocated position and the receiver's previous opinion.

Total (net) change is a function of (1) the amount of change advocated, (2) the importance of the source and (3) the salience of the information at the time of input. Under this formulation, an informal group engaged in communication would increase the redundancy with which any specific group member would advocate a position for another member. Since Woelfel-Saltiel argue that an initial attitudinal position is based on all previous inputs with respect to a set of attitude objects, increased redundancy will, over time, continuously shift a receiver's balance point towards that of the source.

This is not necessarily a recursive process. As one member interacts with and changes in the direction of another member, the first individual is simultaneously responding to the other's feedback. Hence, the discrepancy between the two is being reduced. Given a number of such give-and-take relationships within a communication group, one would predict that, over time, the opinions, roles, drives, and motivations of organizational colleagues will converge. Furthermore, a novice member will undergo this process fairly rapidly as tenure increases. In turn, a member passes at least a part of what is inherited onto later members.

It should be noted that each individual, to the extent that he or she is communicative, adds messages to the total pool and influences the direction of the change processes.

The Woelfel-Saltiel theory differs from traditional theories of attitude change or formation (Heider, 1946; Newcomb, 1953; Festinger, 1957; Osgood, Suci and Tannenbaum, 1957) by suggesting that attitudes are embedded in a continuously changing, multivariate "balance point." Attitudes, themselves, are conceptualized as a predisposition to respond; however, the Woelfel-Saltiel theory emphasizes that the individual processes information related to the attitude through a multidimensional cognitive space. This space consists of an array of many attitude-objects, wherein the distances between the objects can be expressed as scalar representations of the underlying predispositions. Attitude-objects are taken to be those phenomena within the environment to which an individual assigns a valence, either positive or negative, for evaluation purposes.

Unlike Heider (1958), the Woelfel-Saltiel theory specifies the relationship between message volume, the significance of the source, and attitude mass. Message volume is the quantity of input to the receiver across all sources. Attitude mass is that characteristic of an attitude which reflects its resistance to change; mass is a function of the number of messages a person has previously received about the objects of the attitude. In an organizational context, this means that an individual with low tenure is likely to have low-mass attitudes toward informal work rules. Hence, these attitudes will be highly amenable to change. As the member continues in the organization, the message history behind each attitudinal balance point grows large, making change less and less likely.

Heider attributed attitude change to search processes initiated by the individual as a result of some internal state of attraction. The individual attempts

to remain consonant with both the state of attraction to another person and an incongruent attitude between ego and the other. While this scenario is not excluded by the Woelfel-Saltiel formulation, they also include other circumstances in which the individual encounters valenced information toward the objects of an attitude. In other words, according to Woelfel-Saltiel, all information, from all media, contributes to the magnitude, valence, and mass of an attitude.

Woelfel-Saltiel also deviate significantly from Festinger's (1950) conceptualization of the role of dissonance and cognitive consistency as the impetus to attitude change. Again, internal states may initiate an information search which changes the locus of a balance point. However, other motives are not excluded by Woelfel-Saltiel. Similarly, Newcomb's A-B-X model may be seen as a special case of the Woelfel-Saltiel theory. In dyadic interactions, particularly those taking place in a laboratory setting, the topics of communication exchange are not likely to have had a large message history (e.g., they have a low mass). A great many messages may be exchanged rapidly which will induce considerable movement in the locus of the balance point in a relatively short period of time. Woelfel-Saltiel discuss the individual attitude change case (cf. Woelfel and Haller, 1972) and the generalized case of attitude change across an entire culture (Taylor, Barnett and Serota, 1975).

In summary, four factors are causally related to attitude change according to this theory:

(1) the number of new "incoming" messages
(2) the number of messages comprising the initial balance point
(3) the amount of discrepancy between the old attitude and the mean position advocated by the new messages
(4) the credibility or significance of the source and/or the salience of the information for the receiver.

Woelfel and Saltiel (1975:5) state:

> . . . The amount of attitude change is directly related to the product of the average discrepancy between incoming information and the old attitude (average change advocated) and the number of such messages, and inversely related to the sum of the number of messages out of which the change message and the original message is composed. (pp. 4-5)

Our interest here is particularly concerned with attitude change processes and attitude formation processes as a longitudinal activity. For the organizational novice, attitude formation processes about the nature of work and the organizational environment begin with socialization processes during childhood and adolescence. Organizations like the Boy Scouts, Girl Scouts, education institutions, and the family stress the development of leadership qualities and conforming behavior with an eye to "learning to live in the adult world." At least some component of these childhood exercises influences the formation of attitudes toward the working environment. It is argued here that typically these attitudes are of low mass; that is, experiences are likely to have been infrequent, and inconsistent. In effect, the organizational novice is somewhat of an attitudinal tabula rasa.

Development of Hypotheses

Within organizational groups, since inputs are by definition limited, the opportunity to receive variably valenced information is also limited. If any single individual were free to experience the entire range of opinions on a given attitude-object, the theory would predict that one's self-position would converge on the mean for the whole system. However, an informal group has to a certain extent self-selected itself (Moreno, 1934), according to affiliation needs, task-similarity, proximity, and other reasons.

Prior to an individual's entrance into a group, attitude formation processes have already been at work within the group; hence, depending on the integrativeness of the group, attitudes may already be said to be homogeneous on a set of culturally determined objects to some degree. Thus, we would predict that on admission to a communication group (or more precisely, when an individual becomes integrated in an organization such that he is a member of a communication group), the associated information stimuli are a priori restricted in variability.

The Woelfel-Saltiel theory suggests the following hypotheses:

H_1: Groups will differ from one another with respect to a set of work-related attitudes.

This hypothesis addresses the issue of within-group cultural variability. That is, the organization has an overall set of norms and values which constrain the behavior of any individual member. The extent to which any norm acts to constrain is a function of the degree to which that norm is held to be important by a substantial proportion of the organizational or subsystem population. Since the groups have lowered variability due to the homogeneity of input, each group should converge on a unique locus or mean position for each normative item. Thus, not only will groups be more uniform with respect to these norms, they will also be different from each other.

H_2: Communication groups are more homogeneous (with respect to a set of work-related attitudes) than are organizational members who are not communication group members.

Communication groups are designated as a function of frequent and repetitive interactions among members. As a result, attitudes should converge as the number of within-group messages mount. As the attitudes converge, variance will be decreased, irrespective of the mean value for any given group. Hence, greater redundancy of message stimuli should decrease variability among communicants.

H_3: The grand mean for group members with respect to any work-related attitude should not vary from the grand mean for the non-group population.

We are assessing the validity of the null hypothesis in this case. Since each group member has a restricted ratio of input stimuli, each group should converge on a unique mean. However, in any given organization, these means should reflect the range of diversity of attitudes throughout the entire organization. (While many observers [Schein, 1967; Huse, 1975; Lawrence and Lorsch, 1966] have stressed the importance of informal groups in establishing norms, a methodology by which informal groups can be detected within large systems has only recently become available.) The network analysis technique employed in this study (Richards, 1974a,b,c) takes a set of paired data specifying the interactions between individuals within a social environment, where each cell entering is an interaction frequency between two individuals. Cluster analysis techniques (Richards, 1974b) exist which decompose the interaction patterns into "groups."

Methods of group detection have been discussed from a graph-theoretic perspective by Harary, Norman and Cartwright (1965), Flament (1963), and Roby (1968). The application of network analysis to the study of human communication systems has been extensively reviewed by Farace, Monge, Richards, and Jacobson (1973), Guetzkow (1971), Festinger, Schacter, and Back (1951), Jacobson and Seashore (1951), Collins and Ravin (1969), and Porter and Lawler (1972).

These "groups," arising from the data matrix, are ordinarily defined by a set of parameters. Richards (1974) has developed an algorithm which enables these groups to be formed from large organizational data sets. The algorithm allows the investigator considerable flexibility in the detection of such groups, but in general, groups usually meet the following specified parameters:

1. The amount of communication by members within the group must be greater than the amount members engage in outside the group.
2. No group member may be more than a pre-set number of links (that is, communication "steps") from any other member of the group.
3. There must be a path of communication such that any two members of the group are linked together.
4. There must be no subset of nodes or links making up more than a small pre-specified percentage of the total links or nodes, which, when removed, would cause the groups to become disconnected.
5. No group may be smaller than three members

Notice that the criteria do not require that the group recognize or self-define its own existence.

Festinger, Schacter and Back's (1950) classic study of friendship patterns within a housing community found sociometric clique detection procedures useful for analyzing group properties. Schacter demonstrated that contact, principally a function of proximity, determined the development of friendship relationships. The more individuals interacted, the more they grew to like one another. Festinger, et al., found that cohesiveness of a psychological group was an important determinant of the number of deviants and how effectively a group norm was maintained. In other words, the greater the cohesiveness, the greater the number of deviants (in absolute terms), and the easier it was for a group to maintain obedience to a norm. We would argue that this is supportive of our contention that group membership leads to attitudinal uniformity. Note that Festinger's definition of a psychological group is conceptually similar to Smith (1940); however, his clique detection routine is conceptually equivalent to that employed by Richards.

Sociometric groups have, then, been hypothesized to be referential, norm providing, and socially rewarding. It is argued that communication groups within organizations perform functions similar to those of the social group.

Similarly, Bales (1953) found it useful to use communication behavior to describe the functions of social systems. Brown (1974) used interaction patterns to detect patterns of racial and male chauvinism within a college community. The preceding studies differ from the present effort in an important respect. At the operational level, each requires something of a respondent beyond a report of his communication behaviors. The Festinger studies ask the respondent to name his friends. Bales (1951) was more interested in measuring the individual components of a group than differentiating a group from its environment. In the present case, our interests lie in extracting a group from an environment according to a rigid set of criteria and then demonstrating that the fact of patterned interaction has consequences for the individual and the organization.

At its simplest level, network analysis requires individuals to indicate with whom they communicate and how often. The naming can be done either by asking a person to list individuals with whom he/she has frequent contact, or by providing the person with a list of the names of individuals believed to be members of a common social system. Specifying the names to be used on such a list is not a trivial problem. Often one of the most difficult operational problems is specifying who should and should not be included in the system census. This is generally known as a boundary problem, and in the present case has been unambiguously resolved by including only those individuals who are on the payroll of the organization under study.

Often, network analysts will specify the content which is relevant to a particular study. Hence, the investigator might be interested in change processes,

would attempt to have respondents indicate with whom they discuss "new ideas," or innovations. In the present investigation content was not restricted. Subjects were asked to choose those people with whom they interacted on the job.

Channel--that is, face-to-face, telephone, memo or other mediated transmissions--can also be used to discriminate different networks within a common organizational boundary (Farace and Johnson, 1974). In the present study, channel was restricted to face-to-face contacts.

Individuals are assigned different roles as a result of their interaction patterns. Dense clusters become groups. Single individuals linking groups are called liaisons since they provide a means by which information may be exchanged between two groups. Certain group members are linked to other group members in other groups, and are referred to as bridges. Other persons have no links and are referred to as isolates.

Within the algorithm itself, the investigator has a number of parameters at his control. In the present study only reciprocated links--links which are acknowledged by both members of any given dyad--have been included. The links are assumed to be bidirectional; i.e., initiation of contact is presumed to be equal for both members of each dyad. This simplifying assumption is subject to the criticism that it does not recognize the normative force of status rules within hierarchically constrained relationships. Links may also be characterized as having varying strengths. In the present data set the link strength was operationalized as frequency of contact only, disregarding the length of an average contact. Link strength was operationalized as:

How frequently do you talk to _____?

5 Very frequently
4 Frequently
3 Occasionally
2 Infrequently
1 Very infrequently

Responses in the "Very infrequently" category were eliminated from the data set. Thus, link strength values 2-5 are considered to constitute a "communication link" for purposes of this research.

Description of Data Source

The data employed in this study were gathered by survey instruments from a Midwest manufacturing concern of moderate size (approximately 450 employees).[1] These data were originally gathered during 1970 as a part of an effort to monitor an ongoing organizational development program.

This program originated with the introduction of a Scanlon Plan[2] in 1952. The Scanlon Plan is a theory and method of management which rests on the assumption that employee motivation can be facilitated through the distribution of decision-making authority to committees. According to Heinen (1972) the Scanlon Plan stresses the need for:

1. a system of sharing with the employees information about the organization's objectives and problems,
2. a system for increasing organizational effectiveness through the the participation of employees in decisions that affect themselves and their jobs, and
3. a system for establishing a reward structure and leadership practices that foster cooperation.

Subsequent behavioral science inputs have modified the original Scanlon Plan design. Management grid training programs were introduced through Likert (1967) and the Institute for Social Research at the University of Michigan. These

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[1]The data were gathered by Profs. Heinen and E. Jacobson, Department of Psychology, Michigan State University, and made available for secondary analysis.

[2]Thorough discussions of the Scanlon Plan can be found in McGregor (1952), Lesieur (1958), and Doyle (1970).

programs transformed the committee structures into a series of work teams. A work team was defined as a group of people with common responsibility for the organization's work. Each foreman or supervisor was responsible for from one to three work teams of approximately 13 individuals per team. The work team functions to plan the work, identify and solve problems, and to evaluate the activities of the team.

It should be stressed that this organization is unusually sensitive to the need for cooperative or participative management systems. The resultant communication policy may be judged to have enhanced the amount of communication.

Survey data were obtained from the Inter-Company Longitudinal Survey (ICLS) of the Institute of Social Research. Attitude items were measured on five-point Likert scales (see Table 1). The characteristics of the items used in measuring each variable from the ICLS questionnaire were examined through a cluster analysis (Heinen, 1972). As a result of this analysis, 23 items (Appendix A) were chosen by Heinen from a possible 212 on the basis of their ability to discriminate between subjects (Appendix B). Means and standard deviation for each variable are presented in Appendix C. In addition, variables related to age, education and tenure with the firm were added to the set.

Table 1. Network Roles for Employees by Category

ROLE	SUBJECTS
Group members (includes bridges)	180
Liaisons	5
Isolates	81
Others	148
TOTAL	414

Nineteen groups were generated, with a mean size of 9.5 members and a range of three to 26 members. The two groups with less than five members were eliminated from the analysis for statistical considerations; the remaining 17 groups range in size from a minimum of five to a high of 26. The communication groups were not confined to work-team boundaries. Of the 180 group members, 68, or approximately 38%, were assigned to a communication group different from their work team. All roles other than group members were aggregated into the "non-group population" category for purposes of this analysis.

Results

H_1: Groups will differ from one another with respect to a set of work-related attitudes.

Hypothesis 1 indicates that individual groups will converge on a unique value for the various independent variables, but that this value will differ among groups. A one-way analysis of the variance table (Table 2) shows that the groups significantly varied on nine of the 23 items ($p < .05$). While this is supportive of the hypothesis, additional analysis is required to eliminate the possibility of spurious findings.

Basically, it is hypothesized that if informal groups are creating a unique informational environment for members, their complex of attitudes should discriminate the groups. That is, since each group is uniquely achieving a mean value for each work-related attitude, it was predicted that rotating the group members through an (N-1)-dimensional discriminant space, where N is equal to the number of variables, should recreate the network groupings from clusters of the items alone.

A step-wise discriminant analysis was performed in the data with hierarchical clustering (cf. Klecka, 1973). Appendix D gives the entering sequence and

the f-probability of each entered variable. The procedure (Wilkes, Hecyk and Klecka, 197) employed allowed the investigator to indicate the initial group structure. Following the cluster analysis, clusters are compared to the original group and Table 3 gives the comparison between actual and predicted results on a group by group basis. To read the table, look across the row to see how individuals from the network groups are distributed into discriminant clusters. Reading down the columns gives the membership of the discriminant cluster. For example, six individuals from network group 1 were placed in discriminant cluster 1, seven in cluster 6, and one in cluster 17.

Due to list-wise deletion of cases only 121 subjects are included in this analysis. (By list-wise deleting, we mean that when missing data were encountered for a respondent on a variable, all values for all variables for that respondent were deleted from the analysis. Pair-wise deletion leads to unequal cell sizes and is unavailable on the SPSS version 6.0 statistical analysis package. Therefore, the number of subjects was reduced.) Further, because 60 of the 121 respondents did not complete one section of the questionnaire, eight variables (stay with my team; suggest ideas; detailed plan; your needs; self importance; team agrees; goal agreement) were eliminated from the analysis.

The results of the discriminant analysis provide strong support for this hypothesis, and for the theoretical value of the network clique-detection routine. In 59.6% ($p < .0001$) of the cases, individuals were correctly placed in their predicted groups. Given 17 groups of known size, random procedures would correctly place only 6%. In other words, simply knowing the complex of attitudes and the age, tenure, and the education of the communication groups enabled the groups to be reproduced with nearly 60% accuracy.

Table 2. One Way Anova: Variable By Group.

Variable	Sum of Squares	D.F.	F Ratio	F Prob.
Provided Information	212.16	175	1.77	.04
Peer Friendly	227.92	.57	1.49	.11
Peer Attention	66.62	153	2.29	.01
Peers Listen	72.39	151	1.02	.44
Work Group Encouraged	110.88	152	1.93	.02
Work Group Has High Standards	75.68	154	1.93	.02
Work Group Innovative	62.21	152	1.45	.13
Work Group Plans Ahead	88.17	150	.74	.75
Work Group Coordinates	67.48	154	1.26	.23
Team Work	139.63	166	.36	.99
Trust	145.62	167	1.23	.22
Tenure	33.87	162	3.90	.00
Age	187.07	162	3.21	.00
Education	625.90	164	3.47	.00
Rate My Group	216.34	158	15.23	.00
Stay With My Team	162.94	141	1.33	.21
Suggest Ideas	222.25	120	.54	.88
Detailed Plan	154.12	137	2.69	.00
Change Decision	138.39	131	1.47	.15
Your Needs	110.95	130	1.68	.08
Self Importance	116.99	135	.77	.68
Team Agrees	115.02	132	.26	.99
Goal Agreement	89.57	129	1.00	.45

Table 3. Network and Predicted Groupings.

Network Groups	Size																
Group 1	16	6					7								2		1
Group 2	9		4		1									1			2
Group 3	8			6			1			1							
Group 4	8				4			1	1								1
Group 5	7					5				2							
Group 6	21	2					16	1					1				
Group 7	4		1					3									
Group 8	4					1	1		1							1	
Group 9	5									4		1					
Group 10	7				1						2			1	2		1
Group 11	4			4	1							2				1	
Group 12	4						1						3				
Group 13	4													3			
Group 14	2														2		
Group 15	6										2					4	
Group 16	2																2
Group 17	3															1	1
Discriminant Groups		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
TOTAL SIZE (Discriminant)		8	5	8	6	6	2	5	2	7	4	4	4	3	4	9	4	6

Classified: n = 121
59.6% Cases Correctly Classified
$p < .000$

H_2: Communication groups are more homogeneous (with respect to a set of work-related attitudes) than are organizational members who are not work group members.

Figure 1 shows the trajectories of the mean variances for both the group and non-group populations on 23 work-related attitudes. The variance for the grouped population exceeded the variance for the non-group respondents on 13 of the 23 work-related items. Since this represents just barely more than half of the variables, Hypothesis 2 is not supported.

H_3: The grand mean for group members with respect to any work-related attitude should not vary from that for the work group population.

The results of t-tests for all variables broken down by group and non-group populations are given in Table 4. For 18 of the 23 variables the t-value is non-significant ($p < .05$). Given the nature of the exceptions noted below, Hypothesis 3 is regarded as supported, although "support" for null hypotheses is always difficult to justify.

For those variables in which significant differences (Table 5) are obtained, it is possible to observe a pattern. Note that the group mean value for these variables is, in every case, lower than that for the non-group individuals. Lower values represent less support for work team processes. Thus, having knowledge not available to the rest of the team about the functioning of the rest of the organization may enable the group member to assess the ability of the work team to plan ahead, relative to other work teams. Significantly, use of outside sources might reflect greater trust in the outside sources and a consequent (or as a consequence of) lowering of trust within the work team. Following this line of reasoning, one would then predict the differences found for rating of the work team, relative desire to stay with the work team, and the perceived importance of self to the functioning of the work team.

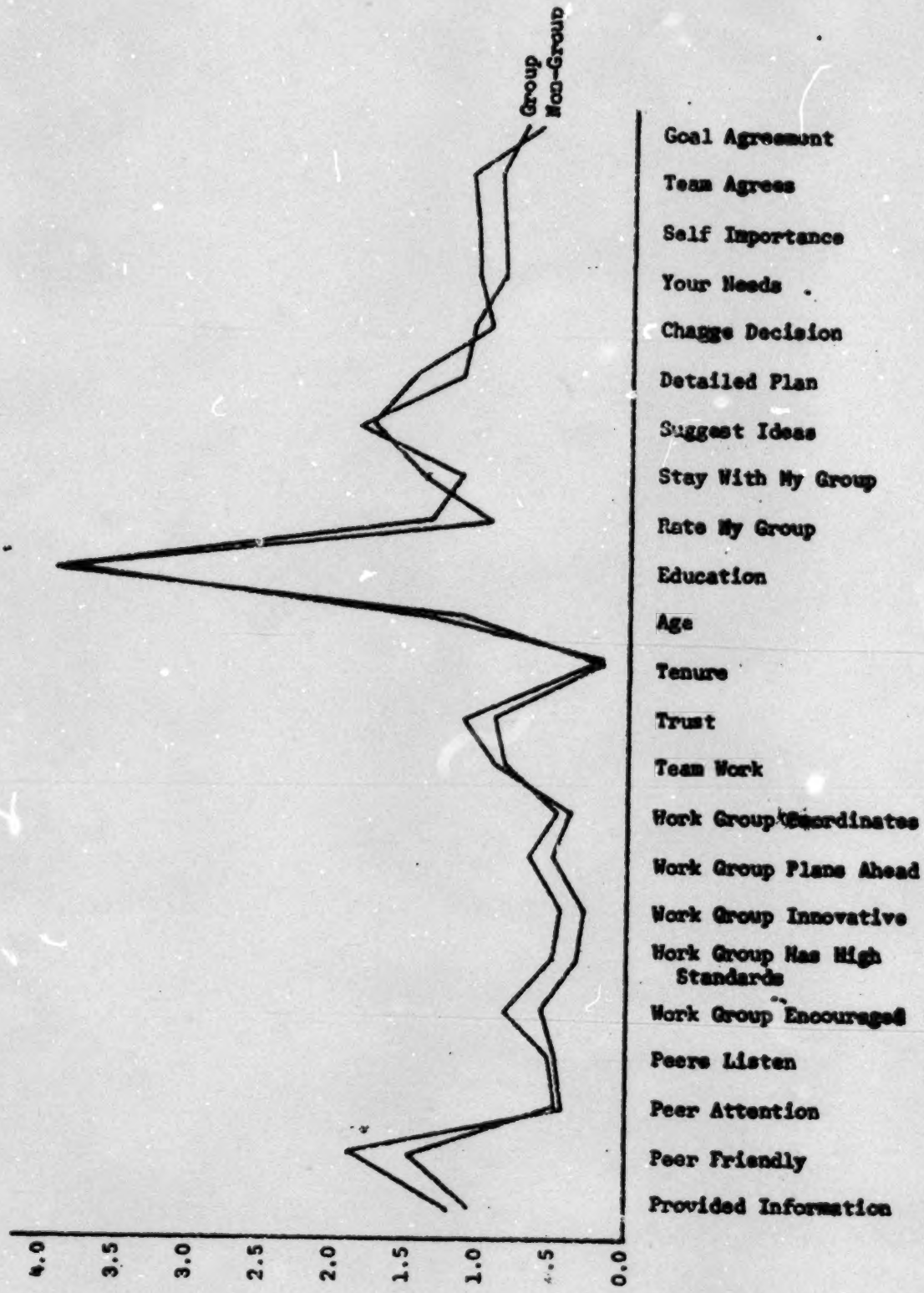

Figure 1. Comparison of Mean Variances for Group and Non-Group Populations.

Table 4. t-Tests Between Non-Group and Group Populations

	Means	t-Value	df	Sig.
Provided Information				
Non-Group	3.47	.59	402	.56
Group	3.40			
Peer Friendly				
Non-Group	3.19	1.19	367	.24
Group	3.02			
Peer Attention				
Non-Group	4.45	.84	353	.40
Group	4.39			
Peer Listen				
Non-Group	4.38	1.32	349	.19
Group	4.28			
Work Group Encouraged				
Non-Group	4.31	1.56	348	.12
Group	4.18			
Work Group Has High Standards				
Non-Group	4.38	1.83	354	.07
Group	4.26			
Work Group Innovative				
Non-Group	4.58	1.39	349	.17
Group	4.49			
Work Group Plans Ahead				
Non-Group	4.54	2.15	341	.03
Group	4.17			
Work Group Coordinates				
Non-Group	4.43	1.03	351	.30
Group	4.36			
Team Work				
Non-Group	3.58	1.11	379	.27
Group	3.47			
Trust				
Non-Group	3.59	2.21	380	.03
Group	3.37			
Tenure				
Non-Group	1.31	.42	372	.68
Group	1.29			

	Means	t-Val	df	Sig.
Age				
Non-Group	2.64	1.44	379	.152
Group	2.47			
Education				
Non-Group	3.26	.40	372	.69
Group	3.17			
Rate My Group				
Non-Group	1.17	3.28	372	.01
Group	.97			
Stay With My Team				
Non-Group	4.02	.02	351	.38
Group	4.02			
Suggest Ideas				
Non-Group	3.49	-.10	316	.92
Group	3.51			
Detailed Plan				
Non-Group	3.38	.87	345	.39
Group	3.27			
Change Decision				
Non-Group	2.89	-.37	330	.71
Group	2.94			
Your Needs				
Non-Group	3.38	2.11	321	.04
Group	3.15			
Self Importance				
Non-Group	3.40	1.49	338	.13
Group	3.24			
Team Agrees				
Non-Group	3.54	.66	334	.51
Group	3.47			
Goal Agreement				
Non-Group	3.50	2.55	331	.01
Group	3.25			

Table 5. Variables with Significant t Differences Between Group and Non-Group Populations.

		Mean	t-Value
Work Group Has High Standards			
	Non-Group	4.28	1.83
	Group	4.26	
Work Group Plans Ahead			
	Non-Group	4.54	2.15
	Group	4.17	
Trust			
	Non-Group	3.59	2.21
	Group	3.17	
Rate My Group			
	Non-Group	1.16	3.28
	Group	.97	
Your Needs			
	Non-Group	3.38	2.11
	Group	3.50	
Goal Agreement			
	Non-Group	3.50	2.66
	Group	3.25	

Since communication groups do not strictly reflect the work team structure, members of communication groups are more likely than non-group members to receive information from a wider variety of sources. Hence, an individual would be less likely to rely upon the work team for social and work-related support. Thus we would expect that group members would vary significantly from the non-group population on variables like goal agreement, intrapersonal needs, rating for the work group, work group standards, work group planning, and work group trust.

Conclusions

Merton (1953) argues that a reference group is any collectivity which provides a frame of reference for the evaluation of one's self and which provides a forum wherein attitude-formation processes may take place. The results of the discriminant analysis provide a convincing demonstration that informal groups provide such a forum. The members of the communication groups can be reliably reconstructed from the configuration of attitudes alone. It should be noted that the variance within the organization on these items (Appendix B) is not very large, hence, we might have expected the more conventional approaches to yield somewhat unsatisfactory findings. We conclude, therefore, that H_1 is supported; H_2 is not supported; and H_3 receives limited confirmation.

Several problems have limited this study. First, the researchers were confronted with problems associated with secondary analysis of the data. The original data were gathered specifically to estimate the effectiveness of the Scanlon Plan. Thus, the design of the items reflected the needs of that particular research effort. Items were created which measured group and individual attitudes toward team development as it is described in the literature of organizational development (cf. Huse, 1975), rather than attitude formation processes. Since this was the case, it is difficult to draw causal conclusions from these data. We would argue that individuals change as they enter communication groups; however, this causal assertion awaits more substantive time-series design.

Secondly, the data suffer from missing values. The original investigators were not overly concerned with a 100% response rate except on the network data. Therefore, we were faced with substantially reduced sample sizes on some variables. This caused group size to vary and inhibited our ability to detect significant differences between groups in the tests of H_2.

This study demonstrates that continued research into the informal communication groups will be fruitful for organizational theory. In addition, a study should be conducted which offers greater opportunity to contrast the efficacy of frequency as a predictor against other variables such as within-group hierarchical differentiation, status, size, and longevity.

Such a study is currently in the design stage. If Woelfel and Saltiel are correct, an adequately operationalized link-strength variable should lead to the identification of individuals who are highly embedded in and interactant with an organizational network. These individuals should have the greatest impact on change within the system.

It is proposed that a longitudinal study be carried out which looks at the correlation between changes in the attitudes of the highly embedded group and changes in the attitude of the network at large.

Secondly, we would argue that the theory requires contact, or interacting opportunities before an individual's messages may impact upon the cognitions of system members. Therefore, a highly embedded group ought also to predict change better than measurements of a management task force. In other words, a second group consisting of members of a self-nominated management task force will be measured and their messages will be counted. Perceived status of the task force will be measured to make certain that salience of the infrequent messages from this group does not intervene. To the extent that change in the highly embedded group predicts change in the rest of the organization, Woelfel-Saltiel will be supported.

Implications for Management Theory

A final note should be made about the relationship between the communication group and the work-team management structure.

Communication groups are norm-providing mechanisms which channel the attitudes of the members along paths which are at variance from the organization. In the case of this organization, we find that the mean for attitudes which would be expected to aid the process of work-team development to be hampered by the informal group structure.

The results show that members of informal groups feel less inclined to trust their work team members; less willing to advocate staying with the work team; less willing to rate highly the performance of their group; and, most importantly, less likely to see themselves as substantially important to the productivity of the team.

This can, however, be looked upon two ways. While these attitudes may affect the performance of the team negatively, these attitudes also might indicate a healthy skepticism. Were each unit to operate in an information vacuum, the importance of team's existence and the contribution of the team would tend to become artificially inflated.

APPENDIX A. ICLS Variables.

1. To what extent do persons in your work group keep each other informed about important events and situations?
2. How friendly and easy to approach are the persons in your work group?
3. When you talk with persons in your work group, to what extent do they pay attention to what you're saying?
4. To what extent are persons in your work group willing to listen to your problems?
5. How much do persons in your work group encourage each other to give their best effort?
6. To what extent do persons in your work group maintain high standards of performance?
7. To what extent do persons in your work group help you find ways to do a better job?
8. To what extent do persons in your work group provide the help you need so that you can plan, organize, and schedule work ahead of time?
9. To what extent do members of your work group plan together and coordinate their efforts?
10. To what extent do you feel that you and the other persons in your work group belong to a team that works together?
11. To what extent do you have confidence and trust in the persons in your work group?
12. When did you first come to work here?
13. Into what age bracket do you fall?
14. How much schooling have you had?

15. On the basis of your experience and information, how would you rate your work group on effectiveness? How well does it do in fulfilling its mission or achieving its goals in comparison with other work groups in the company?
16. How much do the members of your work team want to stay in your work team rather than join any other work team?
17. In discussing a problem in your work team, to what extent do team members feel free to suggest ideas that are different from the majority opinion?
18. In arriving at a decision to a work team problem, how often does your work team outline a detailed action plan?
19. To what extent does your work team feel free to change a previous team decision?
20. To what extent are your interests and needs taken into account when work activities are assigned?
21. To what extent are you important to the smooth operation of your work team?
22. To what extent do the members of your work team see eye to eye on most matters?
23. To what extent do the members of your work team agree with you on what are the basic purposes of your work team?

APPENDIX B. Item Analysis.

The characteristics of the items used in measuring each of the variables from the ICLS questionnaire were examined by Heinen (1972) and the results are reproduced here. The cluster analysis was based upon a sample of 306 individuals from all of the company employees, who had returned completed questionnaires and not merely limited to the members of the communication groups. The total organizational pool of subjects was selected for purposes of generalizability and stability of measurement. The measures used in the study were intended to reflect characteristics of work teams in the whole organization rather than the twenty teams with complete data. Also, the characteristics of cluster analysis require a sample of several hundred to insure the stability of the measures in the analysis. For both these reasons the item analysis used the total organization subject pool.

The items used as measures of the variables for this study that were included in the ICLS questionnaire were:

Cohesiveness

1. To what extent do you feel that you and the other persons in your work group belong to a team that works together?
2. How much do the members of your work team want to stay in your work team rather than join any other work team?

   How does your work team compare with the other work teams at _____ on:

3. the way they get along together?
4. the way they stick together?
5. the way they help each other on the job?

Problem Solving

11. To what extent do persons in your work group keep each other informed about important events and situations?

12. To what extent are persons in your work team willing to listen to your problems?

13. To what extent does your work team plan together and coordinate their efforts?

14. To what extent does your work team make good decisions and solve problems well?

15. In discussing a problem in your work team, to what extent do team members feel free to suggest ideas that are different from the majority opinion?

16. In arriving at a decision to a work team problem, how often does your work team outline a detailed action plan?

17. To what extent does the work team feel free to change a previous team decision?

Identification

21. To what extent do persons in your work team help you find ways to do a better job?

22. To what extent do persons in your work team provide the help you need so that you can plan, organize, and schedule work ahead of time?

23. To what extent are your interests and needs taken into account when work activities are assigned?

24. To what extent are you important to the smooth operation of your work team?

25. To what extent do the members of your work team see eye to eye on most matters?

26. To what extent do the members of your work team agree with you on what are the basic purposes of your work team?

Perceived Team Growth

31. To what extent do you have confidence and trust in the persons in your work group?

32. On the basis of your experience and information, how would you rate your work group on effectiveness? How well does it do in fulfilling its mission or achieving its goals in comparison with other work groups in the company?

33. How do you feel about the progress your work team has made in the last year?

34. To what extent do you believe you have ideas for improving your work team that have not been expressed and fully discussed?

35. To what extent do you think you and the people you work with need training in how to build a more effective work team?

Table 6 gives the inter-item correlation matrix for these items and Table 7 presents the median and the range of the inter-item correlations, item-cluster correlations, and the item communalities for each of the scales contained in the ICLS questionnaire. For all the variables the inter-item correlations, item-cluster correlations, and the item communalities were moderately high to high.

Table 6. ICLS Scales Inter-Item Correlations.

Items	1	2	3	4	5	11	12	13	14	15	16	17	21	22	23	24	25	26	31	32	33	34	35
1	1.00																						
2	.27	1.00																					
3	.44	.22	1.00																				
4	.45	.27	.71	1.00																			
5	.45	.15	.64	.64	1.00																		
11	.47	.24	.35	.32	.42	1.00																	
12	.41	.14	.28	.28	.26	.39	1.00																
13	.71	.23	.32	.35	.43	.47	.36	1.00															
14	.65	.25	.26	.24	.31	.42	.37	.68	1.00														
15	.36	.26	.21	.26	.17	.28	.35	.30	.34	1.00													
16	.38	.22	.20	.18	.27	.29	.22	.35	.34	.40	1.00												
17	.29	.28	.31	.23	.26	.37	.21	.32	.32	.52	.39	1.00											
21	.55	.08	.23	.22	.35	.39	.43	.56	.61	.34	.27	.25	1.00										
22	.52	.15	.24	.21	.31	.41	.41	.55	.47	.27	.24	.22	.68	1.00									
23	.40	.21	.20	.19	.24	.24	.31	.37	.41	.29	.32	.36	.37	.35	1.00								
24	.27	.14	.22	.25	.26	.18	.17	.18	.16	.13	.20	.16	.18	.05	.26	1.00							
25	.41	.16	.31	.23	.35	.44	.37	.35	.31	.29	.29	.36	.34	.34	.41	.35	1.00						
26	.45	.26	.34	.30	.40	.46	.37	.40	.39	.40	.32	.36	.36	.37	.41	.29	.59	1.00					
31	.58	.24	.39	.40	.40	.41	.45	.49	.50	.35	.22	.30	.41	.42	.37	.11	.37	.38	1.00				
32	.55	.31	.43	.41	.41	.32	.27	.51	.49	.31	.35	.25	.35	.33	.30	.19	.25	.38	.38	1.00			
33	.47	.22	.37	.40	.40	.39	.27	.40	.34	.31	.34	.29	.28	.27	.35	.24	.41	.52	.35	.47	1.00		
34	.25	.08	.07	.08	.07	.17	.20	.21	.25	.12	.07	.06	.10	.25	.08	-.03	.10	.18	.13	.23	.25	1.00	
35	.35	.17	.24	.24	.20	.26	.17	.30	.28	.23	.80	.18	.25	.27	.21	.10	.22	.27	.20	.38	.41	.30	1.00

Table 7. Median and Range of Inter-Item Correlations, Item-Cluster, and Item Communalities of Scales in ICLS.

Variable Scales	Inter-Item r's			Item-Cluster r's			Item Communalities		
	median	low	high	median	low	high	median	low	high
Coh	54	44	71	80	55	83	64	31	69
PS	35	30	68	62	58	68	39	34	46
Id	37	34	68	67	58	68	45	33	47
PTG	41	38	47	66	58	70	44	35	49

Alphas were computed for each of these scales for both the total organization sample and also for the twenty production level work teams. The alphas generally are only slightly lower in the smaller production level work team sample (see Table 8).

Table 8. Alphas of ICLS Scales.

Variable Scales	Total Organization	Twenty Production Teams
Coh	83	83
PS	77	71
Id	79	83
PTG	68	68

Table 9. Descriptive Statistics: Group and Non-Group Respondents

Variables	Group				Non-Group			
	n	$\bar{x}$	s	s^2	n	$\bar{x}$	s	s^2
Provided Information	178	3.40	1.01	1.02	226	3.47	1.09	1.18
Peer Friendly	160	3.02	1.21	1.46	209	3.19	1.36	1.85
Peer Attention	156	4.40	.66	.44	199	4.46	.67	.45
Peers Listen	154	4.27	.69	.48	197	4.37	.67	.45
Work Group Encouraged	155	4.18	.86	.73	195	4.31	.73	.54
Work Group Has High Standards	157	4.26	.70	.49	199	4.39	.60	.36
Work Group Innovative	155	4.49	.64	.41	196	4.58	.53	.28
Work Group Plans Ahead	153	4.18	.77	.59	190	4.35	.70	.49
Work Group Coordinates	157	4.36	.66	.44	196	4.34	.63	.39
Team Work	169	3.43	.91	.83	212	3.58	.95	.90
Trust	170	3.37	.93	.87	212	3.60	1.05	1.11
Tenure	165	1.29	.46	.21	209	1.31	.46	.21
Age	167	2.47	1.06	1.13	214	2.64	1.17	1.37
Education	167	3.18	1.96	3.85	207	3.76	1.94	3.78
Rate My Group	161	2.61	1.17	1.37	213	2.97	.97	.94
Stay With My Group	144	4.02	1.07	1.14	209	4.02	1.91	1.42
Suggest Ideas	123	3.51	1.36	1.84	195	3.49	1.33	1.76
Detailed Plan	140	3.27	1.07	1.13	207	3.38	1.22	1.48
Change Decision	134	2.94	1.04	1.08	198	2.90	.98	.96
Your Needs	133	3.15	.93	.86	190	3.38	1.02	1.03
Self Importance	137	3.21	.93	.86	204	3.40	1.02	1.03
Team Agrees	135	3.47	.94	.88	201	3.54	1.03	1.06
Goal Agreement	132	3.26	.85	.73	201	3.50	.80	.64

n = sample size s = standard deviation

$\bar{x}$ = sample mean s^2 = variance

APPENDIX C. Procedures for Discriminant Cluster Analysis.

Table 10. Discriminant Analysis--Step Wise Variable to Enter Sequence Wilke's Lambda Procedure.

Step Number	Variable Entered	F to Enter	Wilkes λ	Sis
1	Provided Information	13.45	.31	.000
2	Peer Friendly	4.65	.18	.000
3	Peer Attention	2.87	.12	.000
4	Peer Listen	2.03	.09	.000
5	Work Group Encouraged	1.844	.07	.000
6	Work Group Has High Standards	1.56	.05	.000
7	Work Group Innovative	.99	.04	.000
8	Work Group Plans Ahead	1.15	.037	.000
9	Wrok Group Coordinates	1.12	.038	.000
10	Team Work	1.23	.025	.000
11	Trust	1.34	.020	.000
12	Tenure	.80	.018	.000
13	Age	.98	.015	.000
14	Education	.79	.018	.000
15	Rate My Group	.41	.012	.000

The entry criterion (Wilkes λ) is that the entered variable produce the greatest increase in the overall F ratio at each successive step.

Table 11. Discriminant Analysis--Group Size for Analysis.

	N		N		N
Group 1	16	Group 7	4	Group 13	4
Group 2	9	Group 8	4	Group 14	2
Group 3	8	Group 9	5	Group 15	6
Group 4	8	Group 10	7	Group 16	2
Group 5	7	Group 11	4	Group 17	3
Group 6	21	Group 12	4		

Table 12. Wilkes λ for Entered Variables

Variable	Wilkes λ	F
Provided Information	.81	1.40
Peer Friendly	.77	1.77
Peer Attention	.67	2.97
Peers Listen	.74	2.10
Work Group Encouraged	.78	1.68
Work Group Has High Standards	.75	2.02
Work Group Innovative	.74	2.12
Work Group Plans Ahead	.88	.85
Work Group Coordinates	.83	1.27
Team Work	.93	.45
Trust	.86	3.71
Tenure	.79	1.65
Age	.73	2.27
Education	.31	13.24

For Wilkes λ the discriminant criterion is the overall multivariate F ratio for the test of differences among the group centroids.

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